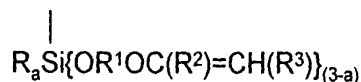


THAT WHICH IS CLAIMED IS:

1. A radiation curable composition comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



wherein R is independently selected from monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from *uncomplete Makosh*

(i) a difunctional vinyl ether reactive diluent selected from butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2-20</sub> bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethenyloxy butyl)-succinate, bis-(4-ethenyloxy butyl)-adipate, bis-(4-ethenyloxy butyl)-glutarate, bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) succinate, bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) adipate, and bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) glutarate or

(ii) an acrylate reactive diluent with the formula



wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at least one acrylate functional group, and b has a value of 2-4,

(iii) a monofunctional vinyl ether reactive diluent selected from cyclohexyl vinyl ether, cyclohexanedimethanol monovinyl ether, hydroxybutyl vinyl ether, dodecyl vinyl ether, diethyleneglycol monovinyl ether, 2-ethylhexyl vinyl ether,

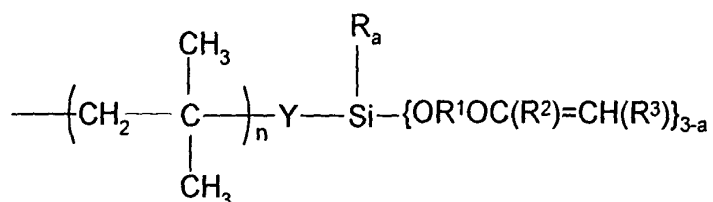
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octadecyl vinyl ether, and tetradecyl vinyl ether, and mixtures thereof, and

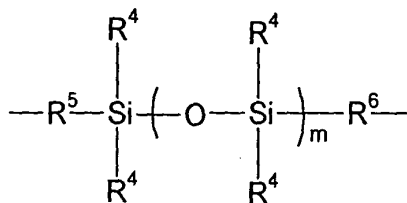
(iv) an epoxy functional reactive diluent.

2. The composition according to Claim 1, wherein R is independently selected from methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, and a has a value of zero.

3. The composition according to Claim 1, wherein (A) is a polymer containing at least one group having the formula



wherein at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units, R is independently selected from monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from group consisting of a hydrogen atom and a monovalent hydrocarbon group, n has a value from 5 to 10,000, a has a value of 0 to 2, and Y is selected from (i) an alkylene group having from 2 to 10 carbon atoms and (ii) a group having the formula



where R<sup>4</sup> is a monovalent hydrocarbon group, R<sup>5</sup> and R<sup>6</sup> are independently alkylene groups having from 2 to 10 carbon atoms, and m is an integer having a value from 1 to 5.

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4. The composition according to Claim 3, wherein R is independently selected *unlike 4-2-2* from methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, a has a value of 0 or 1, and Y(i) is selected from ethylene, propylene, butylene, pentylene, trimethylene, 2-methyltrimethylene, *unlike* pentamethylene, hexamethylene, 3-ethyl-hexamethylene, octamethylene, and decamethylene.

5. The composition according to Claim 3, wherein R is independently selected *unlike* from methyl and methoxy, R<sup>1</sup> is butylene, R<sup>2</sup> and R<sup>3</sup> are hydrogen atoms, and a has a value of 0 or 1, R<sup>4</sup> is methyl, R<sup>5</sup> is propylene, R<sup>6</sup> is ethylene, and m has a value of 1.

6. The composition according to Claim 1, wherein (B) is selected from onium salts, diaryliodonium salts of sulfonic acids, triarylsulfonium salts of sulfonic acids, diaryliodonium salts of boronic acids, and triarylsulfonium salts of boronic acids.

7. The composition according to Claim 1, wherein (B) is selected from *unlike 4-2-2* bis(dodecyl phenyl) iodonium hexafluoroarsenate, bis(dodecylphenyl) iodonium hexafluoroantimonate, dialkylphenyl iodonium hexafluoroantimonate, diaryliodonium salts of perfluorobutanesulfonic acid, diaryliodonium salts of perfluoroethanesulfonic acid, diaryliodonium salts of perfluoro-octanesulfonic acid, diaryliodonium salts of trifluoromethane sulfonic acid, diaryliodonium salts of para-toluene sulfonic acid, diaryliodonium salts of dodecylbenzene sulfonic acid, diaryliodonium salts of benzene sulfonic acid, diaryliodonium salts of 3-nitrobenzene sulfonic acid, triarylsulfonium salts of perfluorobutanesulfonic acid, triarylsulfonium salts of perfluoroethanesulfonic acid, triarylsulfonium salts of perfluoro-octanesulfonic acid, triarylsulfonium salts of trifluoromethane sulfonic acid, triarylsulfonium salts of para-toluene sulfonic acid, triarylsulfonium salts of dodecylbenzene sulfonic acid, triarylsulfonium salts of benzene sulfonic acid, triarylsulfonium salts of 3-nitrobenzene sulfonic acid, diaryliodonium salts of perhaloarylboronic acids, and triarylsulfonium salts of perhaloarylboronic acid.

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8. The composition according to Claim 1, wherein (C)(i) is selected from butanediol divinyl ether, hexanediol divinyl ether, and cyclohexane dimethanol divinyl ether.

9. The composition according to Claim 1, wherein (C)(ii) is selected from ethyl <sup>undecyl</sup> acrylate, propyl acrylate, butyl acrylate, tert.-butyl acrylate, tert.-amyl acrylate, hexyl acrylate, cyclohexyl acrylate, 2-ethylhexyl acrylate, isooctyl acrylate, isodecyl acrylate, dodecyl acrylate, lauryl acrylate, staryl acrylate, ethyleneglycol butyl acrylate, tetrahydrofurfuryl acrylate, isobornyl acrylate, tridecyl acrylate, caprolactone acrylate, 2-phenoxyethyl acrylate, and ethoxylated nonyl phenol acrylate, butanediol diacrylate, hexanediol diacrylate, cyclohexane dimethanol diacrylate, ethylene glycol diacrylate, diethylene glycol diacrylate, triethylene glycol diacrylate, neopentyl glycol diacrylate, ethoxylated<sub>2-20</sub> bisphenol A diacrylate, poly-THF diacrylate, and trimethylolpropane tri acrylate.

10. The composition according to Claim 1, wherein (C)(iii) is octadecyl vinyl ether or tetradecyl vinyl ether.

11. The composition according to Claim 1, wherein (C)(iv) is selected from epoxidized alpha olefin hydrocarbons containing 4 to 16 carbon atoms, 1,4-butanediol diglycidyl ether and dodecyl glycidyl ether.

12. The composition according to claim 1, wherein (C)(iv) is selected from dodecyl glycidyl ether, tetradecyl glycidyl ether and their mixtures.

13. The composition according to Claim 1, wherein the composition further comprises at least one ingredient selected from free radical photoinitiators, <sup>undecyl</sup> photosensitizers, long chain hydrocarbon diluents having ester, ether, anhydride, or carbonyl functional groups, and stabilizers.

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14. The composition according to Claim 13, wherein the free radical photoinitiator is 2-hydroxy-2-methyl-1-phenyl-propan-1-one, wherein the photosensitizer is 2-isopropylthioxanthone or benzophenone, wherein the long chain hydrocarbon diluent is methyl laurate, methyl nonate, ethyl laurate, dioctyl adipate, di-(2-ethylhexyl) phthalate, di-2-ethylhexyl ether, dioctadecyl ether, or succinic anhydride, and wherein the stabilizers are hindered amines, organic phosphites, or hindered phenols.

15. The composition according to Claim 1, wherein the composition further comprises an adhesion promoter.

16. The composition according to Claim 13, wherein the composition further comprises an adhesion promoter.

17. The composition according to Claim 15, wherein the adhesion promoter is an organosilane compound selected from 3-(trimethoxysilyl)propyl acrylate, methacryloxypropyltrimethoxysilane, tetraethoxysilane, allyltrimethoxysilane, vinyltrimethoxysilane, octyltriethoxysilane, methyltriethoxysilane, methyltrimethoxysilane, vinylmethyldimethoxysilane,  $\beta$  - (3,4-epoxycyclohexyl)ethyltrimethoxysilane, and  $\gamma$  - glycidylpropyltrimethoxysilane.

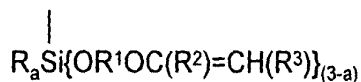
18. The composition according to Claim 16, wherein the adhesion promoter is an alkoxysilane compound selected from 3-(trimethoxysilyl)propyl acrylate, methacryloxypropyltrimethoxysilane, tetraethoxysilane, allyltrimethoxysilane, vinyltrimethoxysilane, vinyltriethoxysilane, octyltriethoxysilane, methyltriethoxysilane, methyltrimethoxysilane, vinylmethyldimethoxysilane,  $\beta$  - (3,4-epoxycyclohexyl)ethyltrimethoxysilane, and  $\gamma$  - glycidylpropyltrimethoxysilane

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19. A method of making a radiation curable composition comprising:

(I) forming a mixture comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



wherein R is independently selected from monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from

(i) a difunctional vinyl ether reactive diluent selected from butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2</sub>-20 bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethenyloxy butyl)-succinate, bis-(4-ethenyloxy butyl)-adipate, bis-(4-ethenyloxy butyl)-glutarate, bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) succinate, bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) adipate, and bis-((4-((ethenyloxy)methyl)cyclohexyl)methyl) glutarate or

(ii) an acrylate reactive diluent with the formula



wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at least one acrylate functional group, and b has a value of 2-4,

(iii) a monofunctional vinyl ether reactive diluent selected from cyclohexyl vinyl ether, cyclohexanedimethanol monovinyl ether, hydroxybutyl vinyl ether, dodecyl vinyl ether, diethyleneglycol monovinyl ether, 2-ethylhexyl vinyl ether,

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octadecyl vinyl ether, and tetradecyl vinyl ether, and mixtures thereof, and  
 (iv) an epoxy functional reactive diluent.

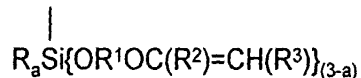
20. The method according to Claim 19, wherein the mixture further comprises at least one ingredient selected from free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having ester, ether, anhydride, or carbonyl functional groups, and stabilizers.

21. The method according to Claim 19, wherein the composition further comprises an adhesion promoter.

22. A method of making an article of manufacture comprising:

(I) applying a radiation curable composition comprising:

(A) an alkenyl ether-functional polyisobutylene polymer in which at least 50 mole percent of the non-terminal repeating units of the polymer are isobutylene units and containing at least one group having the formula



wherein R is independently selected from monovalent hydrocarbon groups and alkoxy groups, R<sup>1</sup> is a divalent hydrocarbon group having from 2 to 20 carbon atoms, R<sup>2</sup> and R<sup>3</sup> are independently selected from a hydrogen atom and a monovalent hydrocarbon group, and a has a value of 0 to 2;

(B) a cationic photoinitiator; and

(C) a miscible reactive diluent selected from

(i) a difunctional vinyl ether reactive diluent selected from butanediol divinyl ether, pentanediol divinyl ether, hexanediol divinyl ether, heptanediol divinyl ether, cyclohexane dimethanol divinyl ether, ethylene glycol divinyl ether, diethylene glycol divinyl ether, triethylene glycol divinyl ether, neopentyl glycol divinyl ether, ethoxylated<sub>2-20</sub> bisphenol A divinyl ether, poly-THF divinyl ether, bis-(4-ethenyloxy butyl)-succinate, bis-(4-ethenyloxy butyl)-adipate, bis-(4-ethenyloxy butyl)-glutarate, bis-

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((4-((ethenyloxy)methyl)cyclohexyl)methyl) succinate, bis((4-((ethenyloxy)methyl)cyclohexyl)methyl) adipate, and bis((4-((ethenyloxy)methyl)cyclohexyl)methyl) glutarate or

(ii) an acrylate reactive diluent with the formula



wherein R<sup>8</sup> is a non-silicon containing organic group, X is an organic group containing at least one acrylate functional group, and b has a value of 2-4.

(iii) a monofunctional vinyl ether reactive diluent selected from cyclohexyl vinyl ether, cyclohexanedimethanol monovinyl ether, hydroxybutyl vinyl ether, dodecyl vinyl ether, diethyleneglycol monovinyl ether, 2-ethylhexyl vinyl ether, octadecyl vinyl ether, and tetradecyl vinyl ether, and mixtures thereof, and

(iv) an epoxy functional reactive diluent;

and

(II) exposing the coating to an energy source selected from (i) ultraviolet light and (ii) visible light in an amount sufficient to cure the coating.

23. The method according to Claim 22, wherein the composition further comprises at least one ingredient selected from free radical photoinitiators, photosensitizers, long chain hydrocarbon diluents having epoxy, ester, ether, glycidyl ether, anhydride, or carbonyl functional groups, and stabilizers.

24. The method according to Claim 22, wherein the composition further comprises an adhesion promoter.